MULTIMEDIA UNIVERSITY

STUDENT IDENTIFICATION NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2016/2017

BDS 4614 – MANAGEMENT DECISION SCIENCE

(All sections / Groups)

4th March 2017
2.30 p.m - 5.30 p.m.
(3 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of **SEVEN (7)** pages with **FIVE (5)** Questions only .

2. Answer **ALL** the questions . All questions carry equal marks and the distribution of the marks for each question is given .

3. Please print all your answers in the Answer Booklet provided .

QUESTION 1

A candy company makes three types of candy, solid-center, fruit-filled, and cream-filled, and packages these candies in three different assortments. A box of assortment I contains 4 solid center, 4 fruit-filled and 12 cream filled candies and sells for $9.40. A box of assortment II contains 12 solid-center, 4 fruit-filled and 4 cream filled candies, and sells of $7.60. A box of assortment III contains 8 solid-center, 8 fruit-filled, and 8 cream filled candies and sells for $11.00. The manufacturing costs per piece of candy are $0.20 for solid-center, $0.25 for fruit-filled and $0.30 for cream-filled. The company can manufacture 4800 solid center, 4000 fruit-filled and 5600 cream-filled candies weekly.

a. Formulate the above problem as a Linear programming problem.

[4 marks]

b. Set up the initial simplex tableau for the above linear programming problem

[4 marks]

Given the following final tableau

C_j →		4	3	5	0	0	0	
↓	Solution Mix	X_1	X_2	X_3	S_1	S_2	S_3	Quantity
4	X_2	0	1	0	0.125	-0.125	0	100
3	X_3	0	0	1	-0.0625	0.25	-0.0625	350
5	X_1	1	0	0	0	-0.125	0.125	200
	Z_j	4	3	5	0.0625	0.375	0.1875	2850
	$C_j - Z_j$	0	0	0	-0.0625	-0.375	-0.1875	

S_1 – slack for total solid-center candies to be manufactured
S_2 – slack for total fruit-filled candies to be manufactured
S_3 – slack for total cream-filled candies to be manufactured

c. How many boxes of each type should the company produce each week in order to maximize their profit?

[2 marks]

d. What are the shadow prices of the three constraints and explain what does it mean?

[3 marks]

e. Determine the range of optimality for the profit contribution rate of assortment I.

[4 marks]

f. Determine the range for the right hand side of the third constraint without changing the dual price.

[3 marks]

[Total: 20 Marks]

Continued...

QUESTION 2

a. SA Global Technology sells mini computers to universities and colleges in Malaysia and ships them from three distribution warehouses. The firm is able to supply the laptops to the universities from three warehouses and to be distributed to four universities by the beginning of the academic year. The shipping costs per laptop from each distributor to each university, supply at each warehouse and demand at each university are summarized in the following table:

Warehouse	University				Supply (units)
	A	B	C	D	
1	21	16	17	22	390
2	13	24	10	18	840
3	25	21	20	15	470
Demand(units)	450	275	565	410	

Determine the optimal production plan that minimizes the total distribution costs?

[10 marks]

b. Four cargo ships will be used for shipping goods from one port to four other ports (labelled 1, 2, 3, 4). Any ship can be used for making any one of these four trips. However, because of differences in the ships and cargos, the total cost of loading, transporting, and unloading the goods for the different ship-port combination varies considerably, as shown in the following table:

Ships	Port			
	1	2	3	4
A	500	400	600	700
B	600	600	700	500
C	700	500	700	600
D	500	400	600	600

Determine the shipping assignments that minimizes the total cost.

[10 marks]

[Total 20 Marks}

Continued....

QUESTION 3

Roy is doing his project in final year of his study. He must complete the project within nine months. He has identified several activities. He has also determined the time requirements (in terms of weeks) and the immediate predecessors of the activities are given in the table below.

Activity	Immediate Predecessors	Optimistic	Most Likely	Pessimistic
A	-	1	3	5
B	-	7	10	13
C	-	5	7	9
D	A	3	5	7
E	D	2	4	6
F	B, E	3	6	9
G	B, C, E	5	9	13
H	F	5	7	12
I	G	3	5	7
J	H, I	3	6	9

a) Draw the project network.

[6 marks]

b) Determine the critical path and the expected project completion time. Compute the earliest start time, latest start time, earliest finish time, latest finish time and slack time for each activity.

[9 marks]

c) Calculate the variance in the expected completion time for the project.

[3 marks]

d) What is the probability that Roy's project will be completed within nine months? (Assume that a month has four weeks)

[2 marks]

[Total 20 Marks]

Continued....

QUESTION 4

A earphone store has an annual demand of 4000 units. The cost of each earphone is RM90, and the inventory carrying cost is estimated to be 10% of the cost of each earphone. The average ordering cost is RM25 per order. It takes about two weeks for an order to arrive from the supplier, and during this time the demand per week for the earphones is 80.

(a) What is the Economic Quantity Order?

[3 marks]

(b) What is the reorder point?

[2 marks]

(c) What is the average inventory?

[1 mark]

(d) What is the annual holding cost?

[1 mark]

(e) How many orders per year would be placed?

[1 mark]

(f) What is the annual ordering cost?

[1 mark]

(g) If the supplier offers a 5% discount on the cost of the earphones if the orders in quantities of 200 or more, should the store take the quantity discount? Assume the demand is constant.

[11 marks]

[Total 20 Marks]

Continued.....

QUESTION 5

a. A manager is considering buying additional tyres to accommodate increasing demand. The alternatives are to buy ten tyres, fifteen tyres or twenty tyres. The profits realized under each alternative are a function of whether their bid for a recent defense contract is accepted or not. The payoff table below illustrates the profits based on the different scenarios faced by the manager:

Alternative	States of Nature	
	Bid Accepted (RM)	Bid Rejected (RM)
Buy ten tyres	15 000	7 500
Buy fifteen tyres	35 000	8 400
Buy twenty tyres	45 000	9 300
Probability	0.5	0.5

(i) What is the best alternative based on Maximax?

[2 marks]

(ii) Determine the best alternative using Equally Likely.

[2 marks]

(iii) Find the best strategy through Criterion of Realism ($\alpha = 0.8$).

[2 marks]

(iv) What is the best decision for the manager using Expected Monetary Value (EMV)?

[2 marks]

Continued.....

b. Sound warehouse in Georgetown sells CD players (with speakers), which it orders from Fuji Electronics in Japan. Because of shipping and handling costs, each order must be for five CD players. Because of the time it takes to receive an order, the warehouse outlet places an order every time the present stock drops to five CD players. It costs $100 to place an order. It costs the warehouse $400 in lost sales when a customer asks for a CD player stored in the warehouse. If a customer cannot purchase a CD player when it is requested, the customer will not wait until one comes in but will go to a competitor. The following probability distribution for demand for CD players has been determined.

Demand	Probability
0	0.04
1	0.08
2	0.28
3	0.4
4	0.16
5	0.02
6	0.02

The time required to receive an order once it is placed has the following probability distribution:

Time to receive an order (months)	Probability
1	0.6
2	0.3
3	0.1

The warehouse has five CD players in stock. Orders are always received at the beginning of the month. Simulate Warehouse's ordering and sales policy for 12 months using the following random numbers.

Demand: 39 73 72 75 37 02 87 98 10 47 93 21

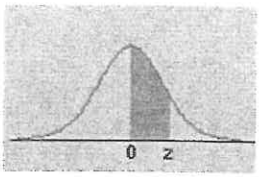
Time to receive an order : 95 97 69 41 91

Determine the average cost per month.

[12 marks]

[Total 20 marks]

End of question paper



	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974

Figure 1